



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,125	08/28/2001	Gurtej Singh Sandhu	303.676US5	7117

21186 7590 12/03/2002

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.  
P.O. BOX 2938  
MINNEAPOLIS, MN 55402

EXAMINER

SPERTY, ARDEN B

ART UNIT	PAPER NUMBER
----------	--------------

1775

9

DATE MAILED: 12/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/941,125

Applicant(s)

SANDHU ET AL.

Examiner

Arden B. Sperty

Art Unit

1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 November 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 51-56, 60-73, 75-78 and 81-85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 51-56 and 60-72 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) g.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 11/18/02 have been considered.
2. The proposed drawing correction is objected to as failing to comply with 37 CFR 1.84(p)(5) because it includes the following reference signs not mentioned in the description: 40 and 42. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference signs in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
3. The drawings are objected to because Figure 3A does not correspond to a cross-sectional view of Figure 1A as indicated in the Brief Description of Drawings on page 4 of the specification. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Specification*

4. The disclosure is objected to because of the following informalities: The use of "therebetween" on page 9 line 17 of the specification is unclear. Does "therebetween" place the optional TiN layer between layers 16 and 17 or between layers 16 and 42?

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. Claims 51-56 and 60-72 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 51, 53, 55, 56, 60 and 66 it is unclear what Applicant intends by specifying that the electrically conductive titanium alloy is a "single" layer. Does "single" mean that the layer is continuous in its coverage of the sides and bottom of the contact hole, or does it mean that there may be only one layer (the titanium alloy layer) between the fill and the sides and bottom of the contact hole?

***Claim Rejections - 35 USC § 102***

6. Claims 51 and 53 are rejected under 35 U.S.C. 102(e) as being anticipated by USPN 6,320,213 to Kirilin et al.

Regarding claims 51 and 53, Kirilin discloses in Figure 27 a via comprising an electrically conductive titanium alloy layer (322) formed overlying walls and an exposed base layer of a contact hole and a fill (324) coupled to the titanium alloy layer comprising aluminum (col 10, lines 26-30). The titanium alloy layer may comprise Ti-Mg-N (col 9, lines 1-24). With specific regard to claim 53, the titanium alloy layer is titanium aluminum nitride (col 9, lines 2-3).

7. Claim 51 is rejected under 35 U.S.C. 102(b) as being anticipated by USPN 4,884,123 to Dixit et al.

Dixit discloses a via comprising an electrically conductive nitride-free titanium alloy layer (20) such as titanium tungsten formed overlying walls and an exposed base layer of a contact hole and a fill (22) comprising tungsten coupled to the titanium alloy layer (col 4, line 36- col 5, line10).

*Allowable Subject Matter*

8. Claims 52, 54, 61-65 and 67-72 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The references, alone or in combination, fail to teach or fairly suggest the inclusion of zinc in the single titanium alloy layer. The references, alone or in combination, fail to teach or fairly suggest a titanium nitride layer interposed between a single titanium alloy layer and an aluminum or tungsten fill.
9. Claims 55, 56, 60 and 66 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.
10. Claims 73, 75-78 and 81-85 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The references, alone or in combination, fail to teach or fairly suggest the inclusion of zinc in the single titanium alloy layer. The references, alone or in combination, fail to teach or fairly suggest a titanium nitride layer interposed between a single titanium alloy layer and an aluminum or tungsten fill.

*Response to Arguments*

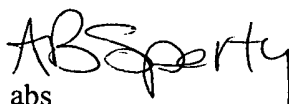
11. Applicant's argument that titanium nitride does not constitute a titanium alloy is acknowledged. It is recognized by the examiner that an alloy must comprise at least two metallic elements and may further comprise other elements (i.e. Ti-Mg-N, Ti-Al-N).

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arden B. Sperty whose telephone number is 703-305-3143. The examiner can normally be reached on M-R, 08:00-16:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
abs  
November 26, 2002

  
DEBORAH JONES  
SUPERVISORY PATENT EXAMINER